

**ABSTRACT OF THE DISCLOSURE**

A method of fabricating a semiconductor device having the steps of forming an insulating layer on a silicon substrate; forming a contact hole in the insulating layer so that a portion of the silicon substrate is exposed in the contact hole; performing an interface treatment process to the exposed portion of the silicon substrate, wherein the interface treatment process includes at least a dry cleaning and a hydrogen heat treatment; and forming a selective silicon plug including single crystalline and polycrystalline silicon structures on the exposed portion of the silicon substrate.